



12/31/2021

**VIA ELECTRONIC FILING (ECFS)**

Marlene H. Dortch, Secretary  
Federal Communications Commission  
45 L Street, NE  
Washington, DC 20554

Re: Notice of *Ex Parte* Presentation, *Expanding Flexible Use of the 3.7-4.2 GHz Band*,  
GN Docket 18-122

Dear Ms. Dortch:

On November 24, 2021, AT&T and Verizon voluntarily committed to certain precautionary measures regarding their C-Band operations through July 5, 2022, over and above the technical restrictions and spectrum buffer the Federal Communications Commission (“Commission”) had already found sufficient to protect radio altimeters in the *C-Band Order*.<sup>1</sup> AT&T and Verizon today also formally certified those commitments, making them enforceable by the Commission. AT&T and Verizon committed to those six-month precautionary measures to quell any remaining objections from aviation interests about the imminent launch of their respective C-Band networks. But undeterred by facts or logic, the Aerospace Industries Association (“AIA”) predictably attacked these new precautionary measures, calling them “inadequate and far too narrow to ensure the safety and economic vitality of the aviation industry.”<sup>2</sup> In its petition for a stay, Airlines for America repeats this same assertion.<sup>3</sup> That claim is utterly unfounded, as discussed below.

As an initial matter, AT&T and Verizon welcome AIA’s long-overdue acknowledgment that its concern relates as much to the “economic vitality of the aviation industry” as to any supposed safety issue.<sup>4</sup> That phrase lays bare AIA’s real agenda. It wants to hold the C-Band

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<sup>1</sup> Report and Order and Order of Proposed Modification, *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, 35 FCC Rcd. 2343 (2020) (“*C-Band Order*” or “*Order*”).

<sup>2</sup> Letter from AIA at 1, GN Docket No. 18-122 (“AIA 12/6/21 Ex Parte”).

<sup>3</sup> Airlines For America, Emergency Petition for Stay at 11, GN Docket No. 18-122 (Dec. 30, 2021). AT&T and Verizon will be separately opposing this baseless petition.

<sup>4</sup> AIA 12/6/21 Ex Parte at 1.

hostage until the wireless industry agrees to cover the costs of upgrading any obsolete altimeters that, in the view of some aviation interests, do an abnormally poor job of filtering signals in bands far removed from the 4.2-4.4 GHz aeronautical altimetry band. But this Commission made clear almost two years ago that it “expect[ed] *the aviation industry* to take account of” the C-Band operations that would launch at scale nearly two years later “and take appropriate action, if necessary, to ensure protection” of these altimeters.<sup>5</sup> In all events, as AIA surely knows, this Commission’s responsibility is not to “ensure . . . the economic vitality of the aviation industry,”<sup>6</sup> but to optimize the value of the electromagnetic spectrum for the benefit of the American public. That is what the Commission did in the *C-Band Order*. AIA is still complaining about that *Order* only because its interests are diametrically opposed to the Commission’s core statutory mission.

AIA’s professed “safety” concerns are no more persuasive, as discussed below. The Commission was right when it found that the operational restrictions and spectrum separation set forth in the *C-Band Order* already fully protect the safety of the flying public, private aircraft, and air transport.<sup>7</sup> But in the spirit of compromise, AT&T and Verizon committed, as a voluntary matter, to additional precautionary measures for the first six months of 2022—not because they are remotely necessary to protect safety, but simply to go the extra mile to resolve any remaining controversy about the imminent launch of their C-Band networks.

The Commission aptly described this set of voluntary new precautionary measures as “one of the most comprehensive efforts in the world to safeguard aviation technologies.”<sup>8</sup> That is an extraordinary endorsement, particularly in context: nearly 40 other countries in which U.S. aircraft routinely operate—including the U.K., Spain, France, Finland, Denmark, and Japan—have opened the same 3.7 GHz band to commercial operations without a single reported case of interference with altimeters operating in the same 4.2-4.4 GHz band.<sup>9</sup> Against that backdrop, AIA’s complaints about the “adequacy” of these precautionary measures are frivolous.

1. It is first important to place this interference dispute in context. Radio interference typically involves simultaneous transmissions on the same frequencies—for example, licensed

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<sup>5</sup> *C-Band Order* ¶ 395 (emphasis added).

<sup>6</sup> AIA 12/6/21 Ex Parte at 1.

<sup>7</sup> *C-Band Order* ¶ 395.

<sup>8</sup> Matt Daneman, *AT&T, Verizon Limit C-Band Deployments Near Airports, Helipads Through July 6*, at 2, *Comm’n’s Daily*, (Nov. 26, 2021) (quoting FCC spokesperson).

<sup>9</sup> See Letter from AT&T and Verizon at 2, GN Docket No. 18-122 (Nov. 24, 2021) (“AT&T-Verizon 11/24 Ex Parte”); see also Letter from CTIA, GN Docket No. 18-122 (Nov. 3, 2021) (“At least two hundred thousand 5G base stations are already operating today in at least a dozen countries with technical rules and proximity to radio altimeter operations that [the aviation industry’s modeling assumptions] would suggest should be seeing harmful interference, yet no known reports of interference exist.”).

and unlicensed uses in the same band.<sup>10</sup> Of course, radio altimeters do not operate in the same C-Band frequencies as the planned wireless operations. They operate instead in a frequency band (4.2-4.4 GHz) that is separated by *at least 400 megahertz* from the C-Band frequencies that AT&T and other licensees plan to use in 2022 (3.7-3.8 GHz) and by at least 220 megahertz from any C-Band frequency licensed for wireless use. The *C-Band Order* concluded that this enormous “spectral separation” between C-Band operations and radio altimeters, combined with “the technical rules on power and emission limits” set forth in that *Order*, “are sufficient to protect aeronautical services in the 4.2-4.4 GHz band.”<sup>11</sup>

That conclusion was plainly correct. Modern radio transmitters are very effective in limiting out-of-band emissions to a small fraction of “in band” emissions. Here, the FCC’s C-Band rules mandate that emissions outside the mobile broadband portion of the C-Band are less than -13 dBm/MHz<sup>12</sup>—which is *sixty million times* lower than the maximum power per megahertz allowed for C-Band 5G operations. Leading equipment vendors have stated on the record that C-Band transmissions will be -30 dBm/MHz or less at 4.2 GHz (the edge of where radio altimeters are authorized to operate)—which is *one and one-half billion times* lower than the maximum power per megahertz allowed for C-Band 5G operations.<sup>13</sup> Likewise, even the most rudimentary radio receivers, if functioning properly, can adequately filter out emissions from other bands to focus on relevant in-band signals. For example, the cheapest transistor radio can discriminate between FM stations less than 0.4 megahertz apart.

The *C-Band Order*’s no-interference finding is even more obviously correct today than it was in March 2020. As noted, wireless carriers in nearly 40 countries throughout Europe and Asia now use the C-Band for 5G, with no reported effects on radio altimeters that operate in the same internationally designated 4.2-4.4 GHz band.<sup>14</sup> Each day U.S. aircraft, carrying thousands of U.S. citizens, land in these countries without incident (and with no expression of concern by the Federal Aviation Administration (“FAA”)). Likewise, two different Navy radars operate on frequencies just below the C-Band at power levels that are 10,000 or more times greater than those 5G base stations will use, again with no reports of interference to aviation altimeters.<sup>15</sup>

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<sup>10</sup> See, e.g., *AT&T Servs. Inc. v. FCC*, No. 20-1190, 2012 WL 6122734 (D.C. Cir. Dec. 28, 2021) (challenge to FCC rules authorizing unlicensed devices to operate in the 6 GHz band without mechanisms to keep them from using the same frequencies at the same time as licensed 6 GHz operations).

<sup>11</sup> *C-Band Order* ¶ 395.

<sup>12</sup> *Id.* ¶ 343.

<sup>13</sup> Letter from Nokia at 1, GN Docket No. 18-122 (Sept. 21, 2021); Letter from Ericsson at 1-2, GN Docket No. 18-122 (Sept. 13, 2021).

<sup>14</sup> Notably, Japan has established a smaller guard band than the FCC and Spain, Denmark, and Finland allow permitted power limits higher than permitted in U.S. urban areas by the FCC. AT&T-Verizon 11/24/21 Ex Parte at 2.

<sup>15</sup> *Id.* at 3.

This real-world evidence amply confirms that 5G operations in the C-Band and altimeters can safely coexist.

2. Nonetheless, in the spirit of compromise, AT&T and Verizon have voluntarily committed to additional precautionary measures for six months while the FAA studies the interference issues this Commission resolved nearly two years ago. In the Commission's words, these new safeguards rank among "the most comprehensive efforts in the world to safeguard aviation technologies."<sup>16</sup>

The new precautionary measures reflect the geometric dimensions of any possible interaction between C-Band base stations and radio altimeters. Modern cell towers are generally designed to direct radio energy at some angle towards the ground, not at the sky, because mobile customers are usually located at or near ground level. Aircraft, of course, fly in the sky. As a result, any cell site signals that might reach the altimeters placed on the bottom of airplanes would be massively attenuated. And any theoretical potential for such interference is limited mainly to situations where aircraft fly very close to the ground, including taking off and landing. Thus, to eliminate any possible concern about this interference, the new safeguards (1) lower the power of C-Band transmissions in all areas above the horizon (as well as lowering power in rural areas below the horizon) and (2) effectively curtail C-Band operations in broadly defined areas near public airports and heliports.

First, AT&T and Verizon committed to operate their 5G base stations for six months at even lower power levels than permitted by the *C-Band Order*.<sup>17</sup> Generally speaking, AT&T and Verizon have committed to limit power radiated *below* the horizon to no more than 62 dBm/MHz. In rural areas, this equates to about 50% less power than permitted by the *C-Band Order*.<sup>18</sup> AT&T and Verizon further agreed to limit radiated power for all of their 5G C-Band base stations directed skyward *above* the horizon to even lower levels.<sup>19</sup> Generally speaking, as the angle above the horizon increases, AT&T and Verizon must ensure further reductions in emitted power.<sup>20</sup> This condition will thus result in significantly lower emissions in navigable airspace than permitted by the *C-Band Order*.

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<sup>16</sup> Matt Daneman, *AT&T, Verizon Limit C-Band Deployments Near Airports, Helipads Through July 6*, at 2, *Commc'ns Daily*, (Nov. 26, 2021) (quoting FCC spokesperson).

<sup>17</sup> AT&T-Verizon 11/24/21 Ex Parte at 6 (Commitments 1, 2).

<sup>18</sup> *C-Band Order* ¶ 335 & n.756.

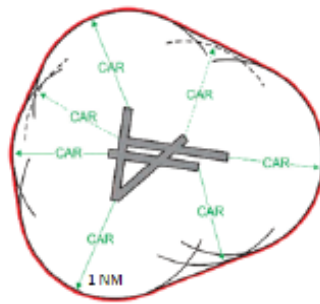
<sup>19</sup> AT&T-Verizon 11/24/21 Ex Parte at 6 (Commitment 1).

<sup>20</sup> *Id.*

*Second*, although the existing restrictions of the *C-Band Order* are more than sufficient to address concerns about aircraft operations at public airports,<sup>21</sup> the new safeguards will surround those airports with large three-dimensional zones that go well beyond those restrictions:

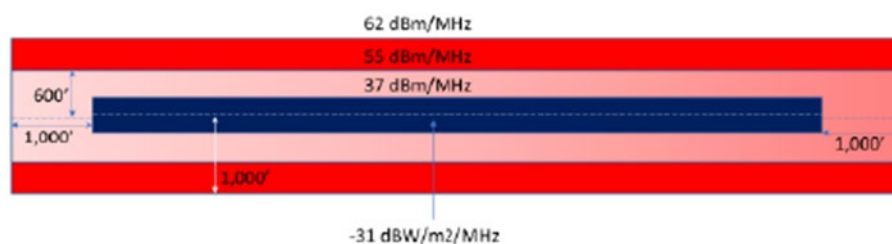
- The safeguards will yield low measured power levels on all airport surfaces, up to 300 feet above airports, and more than one mile from airport runways:<sup>22</sup>

Depiction of the perimeter of a horizontal plane surface, at 300' above the established airport elevation, (i.e., 300' above the Height Above Airport (HAA)), where the PFD shall not exceed -30 dBW/m<sup>2</sup>/MHz.



This commitment addresses not only conventional takeoff and landing scenarios, but also worst-case scenarios where aircraft are diverted from landing at the last minute.

- AT&T and Verizon also agreed to limit radiated power from 5G base stations to even lower levels when those base stations are located in line with airport runways. This commitment can apply to base stations located as far as 1000 feet from a runway, as illustrated here:<sup>23</sup>

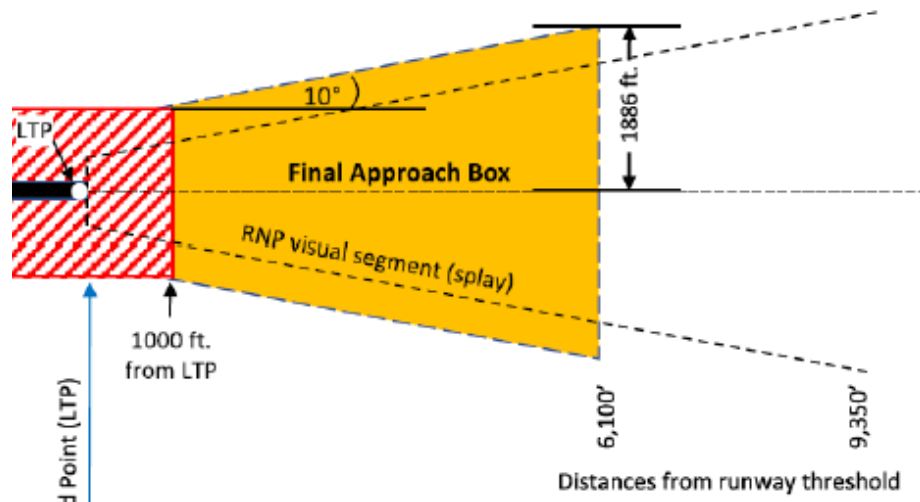


<sup>21</sup> See, e.g., Letter from CTIA & Tech. Annex., GN Docket No. 18-122 (Sept. 3, 2021).

<sup>22</sup> AT&T-Verizon 11/24/21 Ex Parte at 6 (Commitments 3.1-3.3). This commitment includes limitations on radiated 5G signals above an airport as well as strictly limiting radiated 5G signals along airport taxi lanes and all airplane transit areas (aprons, gates, etc.) within airports. *Id.* This protects planes not only in the air, but also ensures radio altimeters will not experience harmful interference when activated during pre-flight checks.

<sup>23</sup> *Id.* at 6-7 (Commitments 3.4-3.5).

- AT&T and Verizon also agreed to limit the height of C-Band antennas and the amount of radiated power for structures located in a designated “Final Approach Box.”<sup>24</sup> This commitment addresses the theoretical possibility of interference when airplanes are making their final approach for landing. AT&T and Verizon agreed to this commitment even though this “final approach box” will extend beyond a mile from the end of a runway:



*Third*, AT&T and Verizon have also agreed to limit radiated 5G power at public heliports.<sup>25</sup> In particular, they committed to ensure that measured power over the primary surface of all helipads is no more than -16 dBW/m<sup>2</sup>/MHz. Unlike airplanes, helicopters take off vertically and there is no need to account for an approach box around a helipad. But by ensuring low power levels at helipad surfaces, this commitment will also necessarily result in reduced power levels above those surfaces in the areas that helicopters use to take off and land.

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These voluntary precautionary measures, which AT&T and Verizon have committed to keep in effect until July 5<sup>th</sup>, 2022, come at a substantial cost. These precautionary measures are particularly likely to impair C-Band operations in commercial areas near airports and helipads. Nonetheless, AT&T and Verizon agreed to these precautionary measures for a limited period to accommodate the FAA’s desire for more time to conduct further study. The suggestion that these extra precautions are “inadequate” is meritless.

<sup>24</sup> *Id.* at 7 (Commitment 3.6).

<sup>25</sup> *Id.* (Commitment 4).

Respectfully submitted,

AT&T SERVICES, INC.

VERIZON

/s/ Joan Marsh

/s/ William H. Johnson

Executive Vice President of Federal  
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